

ChemCatalyst (Copy and answer the part in yellow on the left page)

In the year 1 B.C., King Hiero commissioned the creation of a golden crown. However, he didn't believe that the goldsmith used all gold. He asked Archimedes to determine if the crown was solid gold.

•Do you think Archimedes can determine if the crown is solid gold by putting it under water? Why or why not?

•What happens to the level of the water if you submerge a crown in the water?

The Big Question

- How can we use mass and volume to prove whether or not a substance is gold?

Notes (right page)

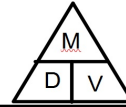
- Mass** is the amount of stuff or substance. We measure mass by measuring weight on a scale or balance.

- Volume** refers to the amount of space occupied by a substance.

Notes (right page)

• **Density** is defined as the mass per unit volume or how much “stuff” there is in a certain space.

$$d = m \div v$$



Activity

Purpose: It is not always easy to tell one form of matter from another. This activity will show you how to differentiate between different forms of matter by examining density, one of the physical properties of matter.

$$\text{density} = \text{mass} \div \text{volume}$$

Metal	Data and Calculations			
	Mass (g)	Volume of water (mL)	Volume of water with metal (mL)	Volume of metal (mL)
2-inch long gold-colored rod				
2-inch long silver-colored rod				
4-inch long silver-colored rod				

Densities of metals				
copper	zinc	gold	aluminum	brass
9.0 g/mL	7.1 g/mL	19.3 g/mL		

Making Sense (answer on exit ticket and turn in)

- How could you use density information to determine if the golden penny you made in class is gold? Why or why not?

Check-In (Copy and answer the part in yellow on the left page)

In 1999 the United States Mint produced a coin called the Golden Dollar. It features an image of Sacagawea, the famous Native American guide for Lewis and Clark. It has a mass of 9.8 g and a volume of 1.1 mL.

- What is the density of this coin?*
- The density of gold is 19.3 g/mL. Is this coin solid gold?*

Wrap-Up

- Density is an intrinsic physical property of matter. It is a measure of the mass per unit of volume of a substance.
- One substance can be distinguished from another by examining its intrinsic physical properties.